

SEQUENCE LISTING

<110> Altboum, Zeev
Barry, Eileen M.
Levine, Myron M.

University of Maryland

<120> ISOLATION AND CHARACTERIZATION OF THE
CSA OPERON

<130> UOFMD.006A

<150> 60/198,626

<151> 2000-04-20

<160> 40

<170> FastSEQ for Windows Version 4.0

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<222> (1)...(717)

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Met His Lys Leu Phe Cys Leu Leu Ser Leu Leu Ile Thr Pro Phe Val

1 5 10 15

gca aat gca aac ttt atg ata tat cca ata tca aaa gat tta aag aat 96

Ala Asn Ala Asn Phe Met Ile Tyr Pro Ile Ser Lys Asp Leu Lys Asn

20 25 30

gga aat agc gag tta att cgt gtt tat tca aaa tca aaa gag ata caa 144

Gly Asn Ser Glu Leu Ile Arg Val Tyr Ser Lys Ser Lys Glu Ile Gln

35 40 45

tat ata aaa ata tat aca aaa aag att att aat ccc ggc aca act gaa 192

Tyr Ile Lys Ile Tyr Thr Lys Lys Ile Ile Asn Pro Gly Thr Thr Glu

50 55 60

gaa cat gaa gtt gat atg ccc aat tgg gat ggt ggg ttt gta gtt act 240

Glu His Glu Val Asp Met Pro Asn Trp Asp Gly Gly Phe Val Val Thr

65 70 75 80

cct caa aaa gtt att ctt cct gca gga ggg agt aaa tca ata cgt tta 288

Pro Gln Lys Val Ile Leu Pro Ala Gly Gly Ser Lys Ser Ile Arg Leu

85 90 95

act caa ttt aga ata cca aaa aaa gag gaa att tat aga gta tat ttt 336

Thr Gln Phe Arg Ile Pro Lys Lys Glu Glu Ile Tyr Arg Val Tyr Phe

100 105 110

gag gcg gta aaa cca gat agc aaa gaa aat gta att gat aat aaa aaa 384

Glu Ala Val Lys Pro Asp Ser Lys Lys Glu Asn Val Ile Asp Asn Lys Lys

115 120 125

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SEQUENCE LISTING

<110> Altboum, Zeev
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<120> ISOLATION AND CHARACTERIZATION OF THE
CSA OPERON

<130> UOFMD.006A

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<160> 40

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<210> 1

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<221> CDS

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| Met His Lys Leu Phe Cys Leu Leu Ser Leu Leu Ile Thr Pro Phe Val | |
| 1 5 10 15 | |

| | |
|---|----|
| gca aat gca aac ttt atg ata tat cca ata tca aaa gat tta aag aat | 96 |
| Ala Asn Ala Asn Phe Met Ile Tyr Pro Ile Ser Lys Asp Leu Lys Asn | |
| 20 25 30 | |

| | |
|---|-----|
| gga aat agc gag tta att cgt gtt tat tca aaa tca aaa gag ata caa | 144 |
| Gly Asn Ser Glu Leu Ile Arg Val Tyr Ser Lys Ser Lys Glu Ile Gln | |
| 35 40 45 | |

| | |
|---|-----|
| tat ata aaa ata tat aca aaa aag att att aat ccc ggc aca act gaa | 192 |
| Tyr Ile Lys Ile Tyr Thr Lys Lys Ile Ile Asn Pro Gly Thr Thr Glu | |
| 50 55 60 | |

| | |
|---|-----|
| gaa cat gaa gtt gat atg ccc aat tgg gat ggt ggg ttt gta gtt act | 240 |
| Glu His Glu Val Asp Met Pro Asn Trp Asp Gly Gly Phe Val Val Thr | |
| 65 70 75 80 | |

| | |
|---|-----|
| cct caa aaa gtt att ctt cct gca gga ggg agt aaa tca ata cgt tta | 288 |
| Pro Gln Lys Val Ile Leu Pro Ala Gly Gly Ser Lys Ser Ile Arg Leu | |
| 85 90 95 | |

act caa ttt aga ata cca aaa aaa gag gaa att tat aga gta tat ttt 336
 Thr Gln Phe Arg Ile Pro Lys Lys Glu Glu Ile Tyr Arg Val Tyr Phe
 100 105 110
 gag gcg gta aaa cca gat agc aaa gaa aat gta att gat aat aaa aaa 384
 Glu Ala Val Lys Pro Asp Ser Lys Glu Asn Val Ile Asp Asn Lys Lys
 115 120 125
 cta aca aca gag cta tct gtt aat ata att tat gcg gct cta atc aga 432
 Leu Thr Thr Glu Leu Ser Val Asn Ile Ile Tyr Ala Ala Leu Ile Arg
 130 135 140
 tct tta cca agt gaa caa aac ata tca cta aac att tct aga aat gca 480
 Ser Leu Pro Ser Glu Gln Asn Ile Ser Leu Asn Ile Ser Arg Asn Ala
 145 150 155 160
 aga aaa aat ata att att tat aat aat ggg aat gtt aga gca ggt gtt 528
 Arg Lys Asn Ile Ile Ile Tyr Asn Asn Gly Asn Val Arg Ala Gly Val
 165 170 175
 aaa gat att tat ttt tgt aag tca tct aat atc gat gat agc tgt gta 576
 Lys Asp Ile Tyr Phe Cys Lys Ser Ser Asn Ile Asp Asp Ser Cys Val
 180 185 190
 aaa aaa acg cat aac aag aat ata tat cca gaa aag tca ttt gat acg 624
 Lys Lys Thr His Asn Lys Asn Ile Tyr Pro Glu Lys Ser Phe Asp Thr
 195 200 205
 ctg gtt aat aac aat ttt tct tat gtt ttc att aaa tta aac cat gaa 672
 Leu Val Asn Asn Asn Phe Ser Tyr Val Phe Ile Lys Leu Asn His Glu
 210 215 220
 gac ata gaa aaa gag caa gga cta ata caa tta aaa gtt cct tga 717
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 Gly Asn Ser Glu Leu Ile Arg Val Tyr Ser Lys Ser Lys Glu Ile Gln
 35 40 45
 Tyr Ile Lys Ile Tyr Thr Lys Lys Ile Ile Asn Pro Gly Thr Thr Glu
 50 55 60
 Glu His Glu Val Asp Met Pro Asn Trp Asp Gly Gly Phe Val Val Thr
 65 70 75 80
 Pro Gln Lys Val Ile Leu Pro Ala Gly Gly Ser Lys Ser Ile Arg Leu

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | | | 85 | | | | 90 | | | | | 95 | | |
| Thr | Gln | Phe | Arg | Ile | Pro | Lys | Lys | Glu | Glu | Ile | Tyr | Arg | Val | Tyr | Phe |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Glu | Ala | Val | Lys | Pro | Asp | Ser | Lys | Glu | Asn | Val | Ile | Asp | Asn | Lys | Lys |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Leu | Thr | Thr | Glu | Leu | Ser | Val | Asn | Ile | Ile | Tyr | Ala | Ala | Leu | Ile | Arg |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Ser | Leu | Pro | Ser | Glu | Gln | Asn | Ile | Ser | Leu | Asn | Ile | Ser | Arg | Asn | Ala |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Arg | Lys | Asn | Ile | Ile | Ile | Tyr | Asn | Asn | Gly | Asn | Val | Arg | Ala | Gly | Val |
| | | | 165 | | | | | | 170 | | | | | 175 | |
| Lys | Asp | Ile | Tyr | Phe | Cys | Lys | Ser | Ser | Asn | Ile | Asp | Asp | Ser | Cys | Val |
| | | 180 | | | | | | 185 | | | | | 190 | | |
| Lys | Lys | Thr | His | Asn | Lys | Asn | Ile | Tyr | Pro | Glu | Lys | Ser | Phe | Asp | Thr |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Leu | Val | Asn | Asn | Asn | Phe | Ser | Tyr | Val | Phe | Ile | Lys | Leu | Asn | His | Glu |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Asp | Ile | Glu | Lys | Glu | Gln | Gly | Leu | Ile | Gln | Leu | Lys | Val | Pro | | |
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| Met | Lys | Leu | Lys | Lys | Thr | Ile | Gly | Ala | Met | Ala | Leu | Thr | Thr | Met | Phe | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| | | | | | | | | | | | | | | | | |
| gta | gct | atg | agt | gct | tct | gca | gta | gag | aaa | aat | atc | act | gta | aca | gct | 96 |
| Val | Ala | Met | Ser | Ala | Ser | Ala | Val | Glu | Lys | Asn | Ile | Thr | Val | Thr | Ala | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| | | | | | | | | | | | | | | | | |
| agt | gtt | gat | cct | aca | att | gat | att | ttg | caa | gct | gat | ggg | agt | agt | tta | 144 |
| Ser | Val | Asp | Pro | Thr | Ile | Asp | Ile | Leu | Gln | Ala | Asp | Gly | Ser | Ser | Leu | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| | | | | | | | | | | | | | | | | |
| cct | act | gct | gta | gaa | tta | acc | tat | tca | cct | gcg | gca | agt | cgt | ttt | gaa | 192 |
| Pro | Thr | Ala | Val | Glu | Leu | Thr | Tyr | Ser | Pro | Ala | Ala | Ser | Arg | Phe | Glu | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| | | | | | | | | | | | | | | | | |
| aat | tat | aaa | atc | gca | act | aaa | gtt | cat | aca | aat | gtt | ata | aat | aaa | aat | 240 |
| Asn | Tyr | Lys | Ile | Ala | Thr | Lys | Val | His | Thr | Asn | Val | Ile | Asn | Lys | Asn | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |
| | | | | | | | | | | | | | | | | |
| gta | cta | gtt | aag | ctt | gta | aat | gat | cca | aaa | ctt | aca | aat | gtt | ttg | gat | 288 |
| Val | Leu | Val | Lys | Leu | Val | Asn | Asp | Pro | Lys | Leu | Thr | Asn | Val | Leu | Asp | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |

tct aca aaa caa ctc ccc att act gta tca tat gga gga aag act cta 336
 Ser Thr Lys Gln Leu Pro Ile Thr Val Ser Tyr Gly Gly Lys Thr Leu
 100 105 110

tca acc gca gat gtg act ttt gaa cct gca gaa tta aat ttt gga acg 384
 Ser Thr Ala Asp Val Thr Phe Glu Pro Ala Glu Leu Asn Phe Gly Thr
 115 120 125

tca ggt gta act ggt gta tct tct tcc caa gat tta gtg att ggt gcg 432
 Ser Gly Val Thr Gly Val Ser Ser Ser Gln Asp Leu Val Ile Gly Ala
 130 135 140

act aca gca caa gca cca acg gcg gga aat tat agt ggg gtc gtt tct 480
 Thr Thr Ala Gln Ala Pro Thr Ala Gly Asn Tyr Ser Gly Val Val Ser
 145 150 155 160

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 Ile Leu Met Thr Leu Ala Ser *
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 Ser Val Asp Pro Thr Ile Asp Ile Leu Gln Ala Asp Gly Ser Ser Leu
 35 40 45
 Pro Thr Ala Val Glu Leu Thr Tyr Ser Pro Ala Ala Ser Arg Phe Glu
 50 55 60
 Asn Tyr Lys Ile Ala Thr Lys Val His Thr Asn Val Ile Asn Lys Asn
 65 70 75 80
 Val Leu Val Lys Leu Val Asn Asp Pro Lys Leu Thr Asn Val Leu Asp
 85 90 95
 Ser Thr Lys Gln Leu Pro Ile Thr Val Ser Tyr Gly Gly Lys Thr Leu
 100 105 110
 Ser Thr Ala Asp Val Thr Phe Glu Pro Ala Glu Leu Asn Phe Gly Thr
 115 120 125
 Ser Gly Val Thr Gly Val Ser Ser Ser Gln Asp Leu Val Ile Gly Ala
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| atg | aca | aaa | aaa | aat | aca | tta | tat | ata | acg | atc | atc | gca | atg | cta | act | 48 |
| Met | Thr | Lys | Lys | Asn | Thr | Leu | Tyr | Ile | Thr | Ile | Ile | Ala | Met | Leu | Thr | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| cca | tat | tca | gtt | ttt | tcc | gga | gat | ata | ccc | aac | tct | ttc | cgt | gat | tta | 96 |
| Pro | Tyr | Ser | Val | Phe | Ser | Gly | Asp | Ile | Pro | Asn | Ser | Phe | Arg | Asp | Leu | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| tgg | gga | gaa | caa | gat | gaa | ttt | tat | gaa | gta | aaa | cta | tat | gga | caa | act | 144 |
| Trp | Gly | Glu | Gln | Asp | Glu | Phe | Tyr | Glu | Val | Lys | Leu | Tyr | Gly | Gln | Thr | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| cta | gga | ata | cat | cga | att | aaa | aca | acc | cca | aca | cat | att | aag | ttt | tat | 192 |
| Leu | Gly | Ile | His | Arg | Ile | Lys | Thr | Thr | Pro | Thr | His | Ile | Lys | Phe | Tyr | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| tca | ccc | gaa | agc | att | tta | gat | aaa | ata | aat | gta | aaa | aaa | gaa | aag | gaa | 240 |
| Ser | Pro | Glu | Ser | Ile | Leu | Asp | Lys | Ile | Asn | Val | Lys | Lys | Glu | Lys | Glu | |
| 65 | | | | | 70 | | | | 75 | | | | | | 80 | |
| aag | aaa | ttg | agt | gtt | ttg | ttc | act | aat | tct | ttt | tca | aga | aat | ggc | aat | 288 |
| Lys | Lys | Leu | Ser | Val | Leu | Phe | Thr | Asn | Ser | Phe | Ser | Arg | Asn | Gly | Asn | |
| | | | 85 | | | | | 90 | | | | | 95 | | | |
| atg | agt | tgt | cag | ggg | aat | gct | act | ata | cag | tat | aac | tgc | aat | tac | att | 336 |
| Met | Ser | Cys | Gln | Gly | Asn | Ala | Thr | Ile | Gln | Tyr | Asn | Cys | Asn | Tyr | Ile | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| aaa | aca | aaa | tca | gta | gat | gtc | atc | gtt | gat | gat | gtt | gat | aat | gtt | gtt | 384 |
| Lys | Thr | Lys | Ser | Val | Asp | Val | Ile | Val | Asp | Asp | Val | Asp | Asn | Val | Val | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| aac | ctt | ttt | ata | ggg | aat | gaa | ttt | ctg | gat | tct | gaa | gca | cac | aat | gat | 432 |
| Asn | Leu | Phe | Ile | Gly | Asn | Glu | Phe | Leu | Asp | Ser | Glu | Ala | His | Asn | Asp | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| gaa | tat | cat | caa | tta | tca | cga | aat | gta | aaa | aaa | gct | ttt | ata | caa | agc | 480 |
| Glu | Tyr | His | Gln | Leu | Ser | Arg | Asn | Val | Lys | Lys | Ala | Phe | Ile | Gln | Ser | |
| 145 | | | | | 150 | | | | 155 | | | | | | 160 | |
| cag | aca | att | aat | gtc | tca | gat | tct | ggg | aag | tat | aaa | agt | ttg | tct | gtt | 528 |
| Gln | Thr | Ile | Asn | Val | Ser | Asp | Ser | Gly | Lys | Tyr | Lys | Ser | Leu | Ser | Val | |
| | | | 165 | | | | | 170 | | | | | 175 | | | |
| tca | ggg | aat | agc | gcg | ctg | ggg | att | aca | gat | aca | agt | tat | gct | gtc | tta | 576 |
| Ser | Gly | Asn | Ser | Ala | Leu | Gly | Ile | Thr | Asp | Thr | Ser | Tyr | Ala | Val | Leu | |
| | | 180 | | | | | | 185 | | | | | 190 | | | |
| aat | tgg | tgg | atg | aat | tac | aat | aaa | ttt | aat | ggg | tac | agc | aac | aac | gaa | 624 |

| | | | | | | | | | | | | | | | | | |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------|--|
| ggc Gly | tca Ser | cta Leu | aat Asn | agt Ser | gag Glu | ttc Phe | agt Ser | ttt Phe | ctt Leu | tgg Trp | gga Gly | gat Asp | aat Asn | gca Ala | aaa Lys | 1296 | |
| | | | 420 | | | | | | 425 | | | | | | 430 | | |
| ggg Gly | aat Asn | tat Tyr | caa Gln | agt Ser | atc Ile | tcg Ser | tat Tyr | acc Thr | gat Asp | gga Gly | ttt Phe | agt Ser | tta Leu | tca Ser | ttt Phe | 1344 | |
| | | | 435 | | | | | | 440 | | | | | | 445 | | |
| tat Tyr | cat His | aat Asn | gat Asp | aag Lys | cgg Arg | gtc Val | gat Asp | aat Asn | tgt Cys | gga Gly | aga Arg | aat Asn | tac Tyr | aat Asn | gct Ala | 1392 | |
| | | | 450 | | | | | | 455 | | | | | | 460 | | |
| ggg Gly | tgg Trp | agt Ser | gga Gly | tgc Cys | tac Tyr | gaa Glu | tca Ser | tat Tyr | tcg Ser | gca Ala | tct Ser | tta Leu | agt Ser | att Ile | cct Pro | 1440 | |
| 465 | | | | | | 470 | | | | | | 475 | | | 480 | | |
| tta Leu | ttg Leu | gga Gly | tgg Trp | aca Thr | agt Ser | act Thr | ctg Leu | gga Gly | tat Tyr | agt Ser | gac Asp | act Thr | tat Tyr | agt Ser | gaa Glu | 1488 | |
| | | | 485 | | | | | | 490 | | | | | | 495 | | |
| tca Ser | gtt Val | tat Tyr | aaa Lys | aac Asn | cat His | att Ile | ctt Leu | tct Ser | gaa Glu | tat Tyr | ggg Gly | ttt Phe | tat Tyr | aat Asn | caa Gln | 1536 | |
| | | | 500 | | | | | | 505 | | | | | | 510 | | |
| aac Asn | ata Ile | tat Tyr | aaa Lys | ggg Gly | aga Arg | acc Thr | caa Gln | aga Arg | tgg Trp | caa Gln | ctg Leu | act Thr | tcg Ser | tcc Ser | acc Thr | 1584 | |
| | | | 515 | | | | | | 520 | | | | | | 525 | | |
| tct Ser | tta Leu | aaa Lys | tgg Trp | atg Met | gat Asp | tat Tyr | aat Asn | ttt Phe | atg Met | cca Pro | gca Ala | att Ile | gga Gly | ata Ile | tat Tyr | 1632 | |
| | | | 530 | | | | | | 535 | | | | | | 540 | | |
| aac Asn | agt Ser | gag Glu | caa Gln | aga Arg | caa Gln | ctg Leu | act Thr | gat Asp | aaa Lys | ggc Gly | gga Gly | tat Tyr | ata Ile | tct Ser | gta Val | 1680 | |
| 545 | | | | | | 550 | | | | | | 555 | | | 560 | | |
| act Thr | ctc Leu | acc Thr | cga Arg | gcc Ala | agc Ser | aga Arg | gaa Glu | aat Asn | tca Ser | tta Leu | aac Asn | gca Ala | ggg Gly | tat Tyr | tct Ser | 1728 | |
| | | | 565 | | | | | | 570 | | | | | | 575 | | |
| tac Tyr | aac Asn | tat Tyr | tcc Ser | aga Arg | gga Gly | aag Lys | tat Tyr | tct Ser | tct Ser | aac Asn | gaa Glu | tta Leu | ttt Phe | gtt Val | gat Asp | 1776 | |
| | | | 580 | | | | | | 585 | | | | | | 590 | | |
| gga Gly | tat Tyr | atg Met | aca Thr | tca Ser | aca Thr | aat Asn | aat Asn | ggg Gly | gac Asp | tat Tyr | cat His | gag Glu | gta Val | aga Arg | atg Met | 1824 | |
| | | | 595 | | | | | | 600 | | | | | | 605 | | |
| cgt Arg | ttt Phe | aat Asn | aaa Lys | aat Asn | aga Arg | cat His | aat Asn | gca Ala | gaa Glu | ggg Gly | aga Arg | ctt Leu | tca Ser | ggg Gly | cgt Arg | 1872 | |
| 610 | | | | | | 615 | | | | | | 620 | | | | | |
| ata Ile | aac Asn | aat Asn | cga Arg | ttt Phe | gga Gly | gat Asp | tta Leu | aat Asn | ggg Gly | tca Ser | ttc Phe | agc Ser | atg Met | aat Asn | aaa Lys | 1920 | |
| 625 | | | | | | 630 | | | | | | 635 | | | 640 | | |

| | |
|---|------|
| aac aga aac acc aac agt agc aat cat tct ctc act ggt ggt tat aat | 1968 |
| Asn Arg Asn Thr Asn Ser Ser Asn His Ser Leu Thr Gly Gly Tyr Asn | |
| 645 650 655 | |
| tcc tca ttt gct ctt aca agt gat gga ttt tac tgg gga gga agt gca | 2016 |
| Ser Ser Phe Ala Leu Thr Ser Asp Gly Phe Tyr Trp Gly Gly Ser Ala | |
| 660 665 670 | |
| tct ggt ttg aca aaa cta gct ggc ggt att atc aag gtt aaa tca aac | 2064 |
| Ser Gly Leu Thr Lys Leu Ala Gly Gly Ile Ile Lys Val Lys Ser Asn | |
| 675 680 685 | |
| gat act aaa aaa aat ctg gta aaa gtg act ggg gca ttg tac ggt gat | 2112 |
| Asp Thr Lys Lys Asn Leu Val Lys Val Thr Gly Ala Leu Tyr Gly Asp | |
| 690 695 700 | |
| tat tcg cta ggg agc aac gat aat gct ttt att cct gta cca gca tta | 2160 |
| Tyr Ser Leu Gly Ser Asn Asp Asn Ala Phe Ile Pro Val Pro Ala Leu | |
| 705 710 715 720 | |
| act cca gcc agt tta att att gaa gat aat aat tat ggt gac aag aat | 2208 |
| Thr Pro Ala Ser Leu Ile Ile Glu Asp Asn Asn Tyr Gly Asp Lys Asn | |
| 725 730 735 | |
| att tct gta ctt gca cca acg aac aac gat atg ttt ata ttg ccg ggt | 2256 |
| Ile Ser Val Leu Ala Pro Thr Asn Asn Asp Met Phe Ile Leu Pro Gly | |
| 740 745 750 | |
| aat gtt tat cct gtt gaa att gaa acc aaa gta agt gtt tct tat att | 2304 |
| Asn Val Tyr Pro Val Glu Ile Glu Thr Lys Val Ser Val Ser Tyr Ile | |
| 755 760 765 | |
| ggt aga ggt ttt gac aaa aac ggc acg cca ctt tct ggc gca cat gtt | 2352 |
| Gly Arg Gly Phe Asp Lys Asn Gly Thr Pro Leu Ser Gly Ala His Val | |
| 770 775 780 | |
| ttg aat gaa cca cat gtt atc ctg gat gag gac ggt gga ttt tcg ttt | 2400 |
| Leu Asn Glu Pro His Val Ile Leu Asp Glu Asp Gly Gly Phe Ser Phe | |
| 785 790 795 800 | |
| gaa tat aca ggt aat gag aaa aca ctt ttt tta tta aag ggc aga act | 2448 |
| Glu Tyr Thr Gly Asn Glu Lys Thr Leu Phe Leu Leu Lys Gly Arg Thr | |
| 805 810 815 | |
| att tat aca tgt caa ctg ggg aaa aat aaa gtt cac aaa ggc att gtt | 2496 |
| Ile Tyr Thr Cys Gln Leu Gly Lys Asn Lys Val His Lys Gly Ile Val | |
| 820 825 830 | |
| ttc gtc gga gat gtt ata tgt gat gtt aat agc aca agt tcc tta cca | 2544 |
| Phe Val Gly Asp Val Ile Cys Asp Val Asn Ser Thr Ser Ser Leu Pro | |
| 835 840 845 | |
| gat gaa ttt gta aag aac cca cgt gtg cag gat ttg ctg gca aag aat | 2592 |
| Asp Glu Phe Val Lys Asn Pro Arg Val Gln Asp Leu Leu Ala Lys Asn | |

850

855

860

gat aaa gga taa
 Asp Lys Gly *
 865

2604

<210> 6
 <211> 867
 <212> PRT
 <213> E. coli

<400> 6

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Thr | Lys | Lys | Asn | Thr | Leu | Tyr | Ile | Thr | Ile | Ile | Ala | Met | Leu | Thr |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Pro | Tyr | Ser | Val | Phe | Ser | Gly | Asp | Ile | Pro | Asn | Ser | Phe | Arg | Asp | Leu |
| | | | 20 | | | | 25 | | | | | 30 | | | |
| Trp | Gly | Glu | Gln | Asp | Glu | Phe | Tyr | Glu | Val | Lys | Leu | Tyr | Gly | Gln | Thr |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Leu | Gly | Ile | His | Arg | Ile | Lys | Thr | Thr | Pro | Thr | His | Ile | Lys | Phe | Tyr |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Ser | Pro | Glu | Ser | Ile | Leu | Asp | Lys | Ile | Asn | Val | Lys | Lys | Glu | Lys | Glu |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Lys | Lys | Leu | Ser | Val | Leu | Phe | Thr | Asn | Ser | Phe | Ser | Arg | Asn | Gly | Asn |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Met | Ser | Cys | Gln | Gly | Asn | Ala | Thr | Ile | Gln | Tyr | Asn | Cys | Asn | Tyr | Ile |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Lys | Thr | Lys | Ser | Val | Asp | Val | Ile | Val | Asp | Asp | Val | Asp | Asn | Val | Val |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Asn | Leu | Phe | Ile | Gly | Asn | Glu | Phe | Leu | Asp | Ser | Glu | Ala | His | Asn | Asp |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Glu | Tyr | His | Gln | Leu | Ser | Arg | Asn | Val | Lys | Lys | Ala | Phe | Ile | Gln | Ser |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Gln | Thr | Ile | Asn | Val | Ser | Asp | Ser | Gly | Lys | Tyr | Lys | Ser | Leu | Ser | Val |
| | | | 165 | | | | | | 170 | | | | | 175 | |
| Ser | Gly | Asn | Ser | Ala | Leu | Gly | Ile | Thr | Asp | Thr | Ser | Tyr | Ala | Val | Leu |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Asn | Trp | Trp | Met | Asn | Tyr | Asn | Lys | Phe | Asn | Gly | Tyr | Ser | Asn | Asn | Glu |
| | 195 | | | | | | 200 | | | | | 205 | | | |
| Arg | Thr | Ile | Asn | Ser | Leu | Tyr | Phe | Arg | His | Asp | Leu | Asp | Lys | Arg | Tyr |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Tyr | Tyr | Gln | Phe | Gly | Arg | Met | Asp | Arg | Thr | Asp | Leu | Ser | Gln | Ser | Ile |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Ser | Gly | Asn | Phe | Asn | Phe | Asn | Leu | Leu | Pro | Leu | Pro | Asp | Ile | Asp | Gly |
| | | | 245 | | | | | | 250 | | | | | 255 | |
| Ile | Arg | Thr | Gly | Thr | Thr | Gln | Ser | Tyr | Ile | Lys | Asn | Thr | Asp | Lys | Phe |
| | | 260 | | | | | | 265 | | | | | 270 | | |
| Ile | Ala | Ser | Pro | Val | Thr | Val | Met | Leu | Thr | Asn | Phe | Ser | Arg | Val | Glu |
| | 275 | | | | | | 280 | | | | | 285 | | | |
| Ala | Phe | Arg | Asn | Asn | Gln | Leu | Leu | Gly | Val | Trp | Tyr | Leu | Asp | Ser | Gly |
| | 290 | | | | | 295 | | | | | 300 | | | | |
| Val | Asn | Glu | Leu | Asp | Thr | Ala | Arg | Leu | Pro | Tyr | Gly | Ser | Tyr | Asp | Leu |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Lys | Leu | Lys | Ile | Phe | Glu | Asn | Thr | Gln | Leu | Val | Arg | Glu | Glu | Ile | Ile |
| | | | | 325 | | | | | 330 | | | | | 335 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Phe | Asn | Lys | Gly | Arg | Ser | Ser | Ile | Gly | Asp | Met | Gln | Trp | Asp | Val |
| | | | 340 | | | | | 345 | | | | | 350 | | |
| Phe | Ile | Gln | Gly | Gly | Asn | Ile | Ile | Asn | Asp | Lys | Asp | Arg | Tyr | Ile | Glu |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Lys | Gln | Asn | Asn | His | Lys | Ser | Ser | Val | Asn | Ala | Gly | Leu | Arg | Leu | Pro |
| | 370 | | | | | 375 | | | | | 380 | | | | |
| Ile | Thr | Lys | Asn | Ile | Ser | Val | Gln | Gln | Gly | Ala | Ser | Val | Ile | Asp | Asn |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |
| Lys | Asn | Tyr | Tyr | Glu | Gly | Ser | Leu | Lys | Trp | Asn | Ser | Gly | Ile | Leu | Ser |
| | | | | 405 | | | | | 410 | | | | | 415 | |
| Gly | Ser | Leu | Asn | Ser | Glu | Phe | Ser | Phe | Leu | Trp | Gly | Asp | Asn | Ala | Lys |
| | | | 420 | | | | | 425 | | | | | 430 | | |
| Gly | Asn | Tyr | Gln | Ser | Ile | Ser | Tyr | Thr | Asp | Gly | Phe | Ser | Leu | Ser | Phe |
| | | 435 | | | | | 440 | | | | | 445 | | | |
| Tyr | His | Asn | Asp | Lys | Arg | Val | Asp | Asn | Cys | Gly | Arg | Asn | Tyr | Asn | Ala |
| | 450 | | | | | 455 | | | | | 460 | | | | |
| Gly | Trp | Ser | Gly | Cys | Tyr | Glu | Ser | Tyr | Ser | Ala | Ser | Leu | Ser | Ile | Pro |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 |
| Leu | Leu | Gly | Trp | Thr | Ser | Thr | Leu | Gly | Tyr | Ser | Asp | Thr | Tyr | Ser | Glu |
| | | | | 485 | | | | | 490 | | | | | 495 | |
| Ser | Val | Tyr | Lys | Asn | His | Ile | Leu | Ser | Glu | Tyr | Gly | Phe | Tyr | Asn | Gln |
| | | | 500 | | | | | 505 | | | | | 510 | | |
| Asn | Ile | Tyr | Lys | Gly | Arg | Thr | Gln | Arg | Trp | Gln | Leu | Thr | Ser | Ser | Thr |
| | | 515 | | | | | 520 | | | | | 525 | | | |
| Ser | Leu | Lys | Trp | Met | Asp | Tyr | Asn | Phe | Met | Pro | Ala | Ile | Gly | Ile | Tyr |
| | 530 | | | | | 535 | | | | | 540 | | | | |
| Asn | Ser | Glu | Gln | Arg | Gln | Leu | Thr | Asp | Lys | Gly | Gly | Tyr | Ile | Ser | Val |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 |
| Thr | Leu | Thr | Arg | Ala | Ser | Arg | Glu | Asn | Ser | Leu | Asn | Ala | Gly | Tyr | Ser |
| | | | | 565 | | | | | 570 | | | | | 575 | |
| Tyr | Asn | Tyr | Ser | Arg | Gly | Lys | Tyr | Ser | Ser | Asn | Glu | Leu | Phe | Val | Asp |
| | | | 580 | | | | | 585 | | | | | 590 | | |
| Gly | Tyr | Met | Thr | Ser | Thr | Asn | Asn | Gly | Asp | Tyr | His | Glu | Val | Arg | Met |
| | | 595 | | | | | 600 | | | | | 605 | | | |
| Arg | Phe | Asn | Lys | Asn | Arg | His | Asn | Ala | Glu | Gly | Arg | Leu | Ser | Gly | Arg |
| | 610 | | | | | 615 | | | | | 620 | | | | |
| Ile | Asn | Asn | Arg | Phe | Gly | Asp | Leu | Asn | Gly | Ser | Phe | Ser | Met | Asn | Lys |
| 625 | | | | | 630 | | | | | 635 | | | | | 640 |
| Asn | Arg | Asn | Thr | Asn | Ser | Ser | Asn | His | Ser | Leu | Thr | Gly | Gly | Tyr | Asn |
| | | | | 645 | | | | | 650 | | | | | 655 | |
| Ser | Ser | Phe | Ala | Leu | Thr | Ser | Asp | Gly | Phe | Tyr | Trp | Gly | Gly | Ser | Ala |
| | | | 660 | | | | | 665 | | | | | 670 | | |
| Ser | Gly | Leu | Thr | Lys | Leu | Ala | Gly | Gly | Ile | Ile | Lys | Val | Lys | Ser | Asn |
| | | 675 | | | | | 680 | | | | | 685 | | | |
| Asp | Thr | L | | | | | | | | | | | | | |

770 775 780
 Leu Asn Glu Pro His Val Ile Leu Asp Glu Asp Gly Gly Phe Ser Phe
 785 790 795 800
 Glu Tyr Thr Gly Asn Glu Lys Thr Leu Phe Leu Leu Lys Gly Arg Thr
 805 810 815
 Ile Tyr Thr Cys Gln Leu Gly Lys Asn Lys Val His Lys Gly Ile Val
 820 825 830
 Phe Val Gly Asp Val Ile Cys Asp Val Asn Ser Thr Ser Ser Leu Pro
 835 840 845
 Asp Glu Phe Val Lys Asn Pro Arg Val Gln Asp Leu Leu Ala Lys Asn
 850 855 860
 Asp Lys Gly
 865

<210> 7
 <211> 330
 <212> DNA
 <213> E. coli

<220>
 <221> CDS
 <222> (1)...(330)

<400> 7
 atc agt aag ttg gca gca tca cct gta ttt ctt gaa aga ggg gtg aat 48
 Ile Ser Lys Leu Ala Ala Ser Pro Val Phe Leu Glu Arg Gly Val Asn
 1 5 10 15

 ata tct gta aga ata cag aag caa att tta tca gaa aaa cca tat gtt 96
 Ile Ser Val Arg Ile Gln Lys Gln Ile Leu Ser Glu Lys Pro Tyr Val
 20 25 30

 gca ttc aga ttg aac gga gac ata cta aga cat tta aag gat gca ttg 144
 Ala Phe Arg Leu Asn Gly Asp Ile Leu Arg His Leu Lys Asp Ala Leu
 35 40 45

 atg ata ata tat ggt atg tca aaa ata gat acc aat gat tgt aga aat 192
 Met Ile Ile Tyr Gly Met Ser Lys Ile Asp Thr Asn Asp Cys Arg Asn
 50 55 60

 atg tca agg aaa ata atg aaa aca gaa gtg gat aaa acc tta ctg gat 240
 Met Ser Arg Lys Ile Met Lys Thr Glu Val Asp Lys Thr Leu Leu Asp
 65 70 75 80

 gta tta aaa aat ata aat agc tat gat gac tca gct ttt ata tct aat 288
 Val Leu Lys Asn Ile Asn Ser Tyr Asp Asp Ser Ala Phe Ile Ser Asn
 85 90 95

 ttg ata tat tta att tca aag atc gag aat aat aaa aaa taa 330
 Leu Ile Tyr Leu Ile Ser Lys Ile Glu Asn Asn Lys Lys *
 100 105

<210> 8
 <211> 109
 <212> PRT
 <213> E. coli

<400> 8
 Ile Ser Lys Leu Ala Ala Ser Pro Val Phe Leu Glu Arg Gly Val Asn
 1 5 10 15
 Ile Ser Val Arg Ile Gln Lys Gln Ile Leu Ser Glu Lys Pro Tyr Val
 20 25 30
 Ala Phe Arg Leu Asn Gly Asp Ile Leu Arg His Leu Lys Asp Ala Leu
 35 40 45
 Met Ile Ile Tyr Gly Met Ser Lys Ile Asp Thr Asn Asp Cys Arg Asn
 50 55 60
 Met Ser Arg Lys Ile Met Lys Thr Glu Val Asp Lys Thr Leu Leu Asp
 65 70 75 80
 Val Leu Lys Asn Ile Asn Ser Tyr Asp Asp Ser Ala Phe Ile Ser Asn
 85 90 95
 Leu Ile Tyr Leu Ile Ser Lys Ile Glu Asn Asn Lys Lys
 100 105

<210> 9
 <211> 1086
 <212> DNA
 <213> E. coli

<220>
 <221> CDS
 <222> (1)...(1086)

<400> 9
 atg aat aag att tta ttt att ttt aca ttg ttt ttc tct tca gta ctt 48
 Met Asn Lys Ile Leu Phe Ile Phe Thr Leu Phe Phe Ser Ser Val Leu
 1 5 10 15
 ttt aca ttt gct gta tcg gca gat aaa att ccc gga gat gaa agc ata 96
 Phe Thr Phe Ala Val Ser Ala Asp Lys Ile Pro Gly Asp Glu Ser Ile
 20 25 30
 act aat att ttt ggc ccg cgt gac agg aac gaa tct tcc ccc aaa cat 144
 Thr Asn Ile Phe Gly Pro Arg Asp Arg Asn Glu Ser Ser Pro Lys His
 35 40 45
 aat ata tta aat aac cat att aca gca tac agt gaa agt cat act ctg 192
 Asn Ile Leu Asn Asn His Ile Thr Ala Tyr Ser Glu Ser His Thr Leu
 50 55 60
 tat gat agg atg act ttt tta tgt ttg tct tct cac aat aca ctt aat 240
 Tyr Asp Arg Met Thr Phe Leu Cys Leu Ser Ser His Asn Thr Leu Asn
 65 70 75 80
 gga gca tgt cca acc agt gag aat cct agc agt tca tcg gtc agc ggt 288
 Gly Ala Cys Pro Thr Ser Glu Asn Pro Ser Ser Ser Ser Val Ser Gly
 85 90 95

| | |
|---|-----|
| gaa aca aat ata aca tta caa ttt acg gaa aaa aga agt tta ata aaa | 336 |
| Glu Thr Asn Ile Thr Leu Gln Phe Thr Glu Lys Arg Ser Leu Ile Lys | |
| 100 105 110 | |
| aga gag cta caa att aaa ggc tat aaa caa tta ttg ttc aaa agt gtt | 384 |
| Arg Glu Leu Gln Ile Lys Gly Tyr Lys Gln Leu Leu Phe Lys Ser Val | |
| 115 120 125 | |
| aac tgc cca tcc ggc cta aca ctt aac tca gct cat ttt aac tgt aat | 432 |
| Asn Cys Pro Ser Gly Leu Thr Leu Asn Ser Ala His Phe Asn Cys Asn | |
| 130 135 140 | |
| aaa aac gcg gct tca ggt gca agt tta tat tta tat att cct gct ggc | 480 |
| Lys Asn Ala Ala Ser Gly Ala Ser Leu Tyr Leu Tyr Ile Pro Ala Gly | |
| 145 150 155 160 | |
| gaa cta aaa aat ttg cct ttt ggt ggt atc tgg gat gct act ctg aag | 528 |
| Glu Leu Lys Asn Leu Pro Phe Gly Gly Ile Trp Asp Ala Thr Leu Lys | |
| 165 170 175 | |
| tta aga gta aaa aga cga tat agt gag acc tat gga act tac act ata | 576 |
| Leu Arg Val Lys Arg Arg Tyr Ser Glu Thr Tyr Gly Thr Tyr Thr Ile | |
| 180 185 190 | |
| aat atc act att aaa tta act gat aag gga aat att cag ata tgg tta | 624 |
| Asn Ile Thr Ile Lys Leu Thr Asp Lys Gly Asn Ile Gln Ile Trp Leu | |
| 195 200 205 | |
| cct cag ttc aaa agt gac gct cgc gtc gat ctt aac ttg cgt cca act | 672 |
| Pro Gln Phe Lys Ser Asp Ala Arg Val Asp Leu Asn Leu Arg Pro Thr | |
| 210 215 220 | |
| ggt ggg ggc aca tat att gga aga aat tct gtt gat atg tgc ttt tat | 720 |
| Gly Gly Gly Thr Tyr Ile Gly Arg Asn Ser Val Asp Met Cys Phe Tyr | |
| 225 230 235 240 | |
| gat gga tat agt act aac agc agc tct ttg gag ata aga ttt cag gat | 768 |
| Asp Gly Tyr Ser Thr Asn Ser Ser Ser Leu Glu Ile Arg Phe Gln Asp | |
| 245 250 255 | |
| aac aat cct aaa tct gat ggg aaa ttt tat cta agg aaa ata aat gat | 816 |
| Asn Asn Pro Lys Ser Asp Gly Lys Phe Tyr Leu Arg Lys Ile Asn Asp | |
| 260 265 270 | |
| gac acc aaa gaa att gca tat act ttg tca ctt ctc ttg gcg ggt aaa | 864 |
| Asp Thr Lys Glu Ile Ala Tyr Thr Leu Ser Leu Leu Leu Ala Gly Lys | |
| 275 280 285 | |
| agt tta act cca aca aat gga acg tca tta aat att gct gac gca gct | 912 |
| Ser Leu Thr Pro Thr Asn Gly Thr Ser Leu Asn Ile Ala Asp Ala Ala | |
| 290 295 300 | |
| tct ctg gaa aca aac tgg aat aga att aca gct gtc acc atg cca gaa | 960 |
| Ser Leu Glu Thr Asn Trp Asn Arg Ile Thr Ala Val Thr Met Pro Glu | |

<400> 14
ctcatggctc catttggtgc aaatgcaaac tttatg

36

<210> 15
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 15
gggatcgatc ccggggcggc cgcgggcccg gtaccaggcc ttctagaaag cttgacgctg 60

<210> 16
<211> 61
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 16
cccgctagcg gcgcgcctcg cgaggatccg tcgacgacgt caagctttct agaaggcctg 60
g 61

<210> 17
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 17
aagcttgacg tcgtcgacgg 20

<210> 18
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 18
cccgctagcg gcgcgcctcg cg 22

<210> 19
<211> 26
<212> DNA
<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 19

ccgtgctgac tctacacccc cagatg

26

<210> 20

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 20

gcacatagag aggatagtaa cgccg

25

<210> 21

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 21

cggtcattgt tggccgtgcg ctgcc

25

<210> 22

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 22

cacgcagcgc gctgatgcct tccacgcg

28

<210> 23

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 23

catatttgat atctgagata tctgg

25

<210> 24

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 24

tgttgcattc agattgaacg gag

23

<210> 25

<211> 24

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 25

tattatgatt cataaatata ctgt

24

<210> 26

<211> 50

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 26

tgtgggtatt tgtttgaca tcgcagcatt aaatataaaa atagcacagg

50

<210> 27

<211> 7239

<212> DNA

<213> E. coli

<220>

<221> CDS

<222> (283) ... (999)

<221> CDS

<222> (1028) ... (1531)

<221> CDS

<222> (1589) ... (4192)

<221> CDS

<222> (4196) ... (5281)

<221> CDS

<222> (5790) ... (6119)

<400> 27

atatacttta ttgaggaata tcggtgtcat tgagtaccgt taacttaaga taaagaatct 60
gtctggaaat cgcaggacca agaactctca gtacatctgt ggcgataata ttatcgcttc 120
ttatacattc caatatgcag ttcttgtggg tatttgtttg gacatcgag cattaaatat 180
aaaaatagca caggaggcat aattatttgt ttttactgtc ttattttttt atcccathtt 240
tttttgtttt gatttatctt tgatgaaagc tcaggaggga atatg cat aaa tta ttt 297

His Lys Leu Phe

tgt tta cta agt tta ctc ata act cca ttt gtt gca aat gca aac ttt 345
 Cys Leu Leu Ser Leu Leu Ile Thr Pro Phe Val Ala Asn Ala Asn Phe
 5 10 15 20

atg ata tat cca ata tca aaa gat tta aag aat gga aat agc gag tta 393
 Met Ile Tyr Pro Ile Ser Lys Asp Leu Lys Asn Gly Asn Ser Glu Leu
 25 30 35

att cgt gtt tat tca aaa tca aaa gag ata caa tat ata aaa ata tat 441
 Ile Arg Val Tyr Ser Lys Ser Lys Glu Ile Gln Tyr Ile Lys Ile Tyr
 40 45 50

aca aaa aag att att aat ccc ggc aca act gaa gaa cat gaa gtt gat 489
 Thr Lys Lys Ile Ile Asn Pro Gly Thr Thr Glu Glu His Glu Val Asp
 55 60 65

atg ccc aat tgg gat ggt ggg ttt gta gtt act cct caa aaa gtt att 537
 Met Pro Asn Trp Asp Gly Gly Phe Val Val Thr Pro Gln Lys Val Ile
 70 75 80

ctt cct gca gga ggg agt aaa tca ata cgt tta act caa ttt aga ata 585
 Leu Pro Ala Gly Gly Ser Lys Ser Ile Arg Leu Thr Gln Phe Arg Ile
 85 90 95 100

cca aaa aaa gag gaa att tat aga gta tat ttt gag gcg gta aaa cca 633
 Pro Lys Lys Glu Glu Ile Tyr Arg Val Tyr Phe Glu Ala Val Lys Pro
 105 110 115

gat agc aaa gaa aat gta att gat aat aaa aaa cta aca aca gag cta 681
 Asp Ser Lys Glu Asn Val Ile Asp Asn Lys Lys Leu Thr Thr Glu Leu
 120 125 130

tct gtt aat ata att tat gcg gct cta atc aga tct tta cca agt gaa 729
 Ser Val Asn Ile Ile Tyr Ala Ala Leu Ile Arg Ser Leu Pro Ser Glu
 135 140 145

caa aac ata tca cta aac att tct aga aat gca aga aaa aat ata att 777
 Gln Asn Ile Ser Leu Asn Ile Ser Arg Asn Ala Arg Lys Asn Ile Ile
 150 155 160

att tat aat aat ggg aat gtt aga gca ggt gtt aaa gat att tat ttt 825
 Ile Tyr Asn Asn Gly Asn Val Arg Ala Gly Val Lys Asp Ile Tyr Phe
 165 170 175 180

tgt aag tca tct aat atc gat gat agc tgt gta aaa aaa acg cat aac 873
 Cys Lys Ser Ser Asn Ile Asp Asp Ser Cys Val Lys Lys Thr His Asn
 185 190 195

aag aat ata tat cca gaa aag tca ttt gat acg ctg gtt aat aac aat 921
 Lys Asn Ile Tyr Pro Glu Lys Ser Phe Asp Thr Leu Val Asn Asn Asn
 200 205 210

ttt tct tat gtt ttc att aaa tta aac cat gaa gac ata gaa aaa gag 969

Phe Ser Tyr Val Phe Ile Lys Leu Asn His Glu Asp Ile Glu Lys Glu
 215 220 225

caa gga cta ata caa tta aaa gtt cct tga tta ctcatctata tactaaggag 1022
 Gln Gly Leu Ile Gln Leu Lys Val Pro * Leu
 230 235

ttctaatagaa attaaaaaaaa actattggtg caatg gca ctg acc aca atg ttt 1075
 Ala Leu Thr Thr Met Phe
 240

gta gct atg agt gct tct gca gta gag aaa aat atc act gta aca gct 1123
 Val Ala Met Ser Ala Ser Ala Val Glu Lys Asn Ile Thr Val Thr Ala
 245 250 255 260

agt gtt gat cct aca att gat att ttg caa gct gat ggt agt agt tta 1171
 Ser Val Asp Pro Thr Ile Asp Ile Leu Gln Ala Asp Gly Ser Ser Leu
 265 270 275

cct act gct gta gaa tta acc tat tca cct gcg gca agt cgt ttt gaa 1219
 Pro Thr Ala Val Glu Leu Thr Tyr Ser Pro Ala Ala Ser Arg Phe Glu
 280 285 290

aat tat aaa atc gca act aaa gtt cat aca aat gtt ata aat aaa aat 1267
 Asn Tyr Lys Ile Ala Thr Lys Val His Thr Asn Val Ile Asn Lys Asn
 295 300 305

gta cta gtt aag ctt gta aat gat cca aaa ctt aca aat gtt ttg gat 1315
 Val Leu Val Lys Leu Val Asn Asp Pro Lys Leu Thr Asn Val Leu Asp
 310 315 320

tct aca aaa caa ctc ccc att act gta tca tat gga gga aag act cta 1363
 Ser Thr Lys Gln Leu Pro Ile Thr Val Ser Tyr Gly Gly Lys Thr Leu
 325 330 335 340

tca acc gca gat gtg act ttt gaa cct gca gaa tta aat ttt gga acg 1411
 Ser Thr Ala Asp Val Thr Phe Glu Pro Ala Glu Leu Asn Phe Gly Thr
 345 350 355

tca ggt gta act ggt gta tct tct tcc caa gat tta gtg att ggt gcg 1459
 Ser Gly Val Thr Gly Val Ser Ser Ser Gln Asp Leu Val Ile Gly Ala
 360 365 370

act aca gca caa gca cca acg gcg gga aat tat agt ggg gtc gtt tct 1507
 Thr Thr Ala Gln Ala Pro Thr Ala Gly Asn Tyr Ser Gly Val Val Ser
 375 380 385

atc tta atg acc tta gca tca taa ata ttttaatat taaaggagca 1554
 Ile Leu Met Thr Leu Ala Ser * Ile
 390 395

ggcacactgc tccttattat atggcaataa taaaatg aca aaa aaa aat aca tta 1609
 Thr Lys Lys Asn Thr Leu
 400

| | |
|---|------|
| tat ata acg atc atc gca atg cta act cca tat tca gtt ttt tcc gga | 1657 |
| Tyr Ile Thr Ile Ile Ala Met Leu Thr Pro Tyr Ser Val Phe Ser Gly | |
| 405 410 415 | |
| gat ata ccc aac tct ttc cgt gat tta tgg gga gaa caa gat gaa ttt | 1705 |
| Asp Ile Pro Asn Ser Phe Arg Asp Leu Trp Gly Glu Gln Asp Glu Phe | |
| 420 425 430 | |
| tat gaa gta aaa cta tat gga caa act cta gga ata cat cga att aaa | 1753 |
| Tyr Glu Val Lys Leu Tyr Gly Gln Thr Leu Gly Ile His Arg Ile Lys | |
| 435 440 445 450 | |
| aca acc cca aca cat att aag ttt tat tca ccc gaa agc att tta gat | 1801 |
| Thr Thr Pro Thr His Ile Lys Phe Tyr Ser Pro Glu Ser Ile Leu Asp | |
| 455 460 465 | |
| aaa ata aat gta aaa aaa gaa aag gaa aag aaa ttg agt gtt ttg ttc | 1849 |
| Lys Ile Asn Val Lys Lys Glu Lys Glu Lys Lys Leu Ser Val Leu Phe | |
| 470 475 480 | |
| act aat tct ttt tca aga aat ggc aat atg agt tgt cag ggg aat gct | 1897 |
| Thr Asn Ser Phe Ser Arg Asn Gly Asn Met Ser Cys Gln Gly Asn Ala | |
| 485 490 495 | |
| act ata cag tat aac tgc aat tac att aaa aca aaa tca gta gat gtc | 1945 |
| Thr Ile Gln Tyr Asn Cys Asn Tyr Ile Lys Thr Lys Ser Val Asp Val | |
| 500 505 510 | |
| atc gtt gat gat gtt gat aat gtt gtt aac ctt ttt ata ggt aat gaa | 1993 |
| Ile Val Asp Asp Val Asp Asn Val Val Asn Leu Phe Ile Gly Asn Glu | |
| 515 520 525 530 | |
| ttt ctg gat tct gaa gca cac aat gat gaa tat cat caa tta tca cga | 2041 |
| Phe Leu Asp Ser Glu Ala His Asn Asp Glu Tyr His Gln Leu Ser Arg | |
| 535 540 545 | |
| aat gta aaa aaa gct ttt ata caa agc cag aca att aat gtc tca gat | 2089 |
| Asn Val Lys Lys Ala Phe Ile Gln Ser Gln Thr Ile Asn Val Ser Asp | |
| 550 555 560 | |
| tct ggg aag tat aaa agt ttg tct gtt tca ggg aat agc gcg ctg ggt | 2137 |
| Ser Gly Lys Tyr Lys Ser Leu Ser Val Ser Gly Asn Ser Ala Leu Gly | |
| 565 570 575 | |
| att aca gat aca agt tat gct gtc tta aat tgg tgg atg aat tac aat | 2185 |
| Ile Thr Asp Thr Ser Tyr Ala Val Leu Asn Trp Trp Met Asn Tyr Asn | |
| 580 585 590 | |
| aaa ttt aat ggt tac agc aac aac gaa aga aca atc aat agt ttg tac | 2233 |
| Lys Phe Asn Gly Tyr Ser Asn Asn Glu Arg Thr Ile Asn Ser Leu Tyr | |
| 595 600 605 610 | |
| ttt aga cat gat tta gat aag aga tat tat tat caa ttt gga cga atg | 2281 |
| Phe Arg His Asp Leu Asp Lys Arg Tyr Tyr Tyr Gln Phe Gly Arg Met | |
| 615 620 625 | |

| | |
|---|------|
| gat cgt aca gat ttg tca caa agt att agc ggg aac ttt aat ttt aac | 2329 |
| Asp Arg Thr Asp Leu Ser Gln Ser Ile Ser Gly Asn Phe Asn Phe Asn | |
| 630 635 640 | |
| tta ctt cct tta ccc gat att gat ggt ata agg aca gga acc aca caa | 2377 |
| Leu Leu Pro Leu Pro Asp Ile Asp Gly Ile Arg Thr Gly Thr Thr Gln | |
| 645 650 655 | |
| tct tat atc aaa aat aca gat aag ttt atc gca tcc cct gta act gtt | 2425 |
| Ser Tyr Ile Lys Asn Thr Asp Lys Phe Ile Ala Ser Pro Val Thr Val | |
| 660 665 670 | |
| atg tta act aat ttt tcc aga gtg gaa gct ttt cgc aat aat caa tta | 2473 |
| Met Leu Thr Asn Phe Ser Arg Val Glu Ala Phe Arg Asn Asn Gln Leu | |
| 675 680 685 690 | |
| ttg ggc gta tgg tat tta gat tct gga gta aat gaa tta gat aca gct | 2521 |
| Leu Gly Val Trp Tyr Leu Asp Ser Gly Val Asn Glu Leu Asp Thr Ala | |
| 695 700 705 | |
| cgt tta cct tat ggt agt tac gat ctt aaa tta aaa att ttt gaa aat | 2569 |
| Arg Leu Pro Tyr Gly Ser Tyr Asp Leu Lys Leu Lys Ile Phe Glu Asn | |
| 710 715 720 | |
| act cag tta gtt cgt gaa gaa ata att cct ttt aat aaa ggg aga agt | 2617 |
| Thr Gln Leu Val Arg Glu Glu Ile Ile Pro Phe Asn Lys Gly Arg Ser | |
| 725 730 735 | |
| tct att ggt gat atg caa tgg gac gtt ttc att cag gga ggg aat att | 2665 |
| Ser Ile Gly Asp Met Gln Trp Asp Val Phe Ile Gln Gly Gly Asn Ile | |
| 740 745 750 | |
| att aat gac aag gat cgt tac ata gaa aaa caa aat aat cat aag tca | 2713 |
| Ile Asn Asp Lys Asp Arg Tyr Ile Glu Lys Gln Asn Asn His Lys Ser | |
| 755 760 765 770 | |
| tca gtt aat gct ggg cta cgt tta cca att acg aaa aat atc tct gtt | 2761 |
| Ser Val Asn Ala Gly Leu Arg Leu Pro Ile Thr Lys Asn Ile Ser Val | |
| 775 780 785 | |
| caa caa gga gca tct gtt ata gat aat aaa aat tat tat gaa ggg agt | 2809 |
| Gln Gln Gly Ala Ser Val Ile Asp Asn Lys Asn Tyr Tyr Glu Gly Ser | |
| 790 795 800 | |
| ctc aaa tgg aat tcc ggc att ctg tct ggc tca cta aat agt gag ttc | 2857 |
| Leu Lys Trp Asn Ser Gly Ile Leu Ser Gly Ser Leu Asn Ser Glu Phe | |
| 805 810 815 | |
| agt ttt ctt tgg gga gat aat gca aaa ggt aat tat caa agt atc tcg | 2905 |
| Ser Phe Leu Trp Gly Asp Asn Ala Lys Gly Asn Tyr Gln Ser Ile Ser | |
| 820 825 830 | |
| tat acc gat gga ttt agt tta tca ttt tat cat aat gat aag cgg gtc | 2953 |
| Tyr Thr Asp Gly Phe Ser Leu Ser Phe Tyr His Asn Asp Lys Arg Val | |

| | |
|---|----------------|
| Asp Gly Phe Tyr Trp Gly Gly Ser Ala Ser Gly Leu Thr Lys Leu Ala | |
| 1060 | 1065 1070 |
| ggc ggt att atc aag gtt aaa tca aac gat act aaa aaa aat ctg gta | 3673 |
| Gly Gly Ile Ile Lys Val Lys Ser Asn Asp Thr Lys Lys Asn Leu Val | |
| 1075 | 1080 1085 1090 |
| aaa gtg act ggg gca ttg tac ggt gat tat tcg cta ggg agc aac gat | 3721 |
| Lys Val Thr Gly Ala Leu Tyr Gly Asp Tyr Ser Leu Gly Ser Asn Asp | |
| 1095 | 1100 1105 |
| aat gct ttt att cct gta cca gca tta act cca gcc agt tta att att | 3769 |
| Asn Ala Phe Ile Pro Val Pro Ala Leu Thr Pro Ala Ser Leu Ile Ile | |
| 1110 | 1115 1120 |
| gaa gat aat aat tat ggt gac aag aat att tct gta ctt gca cca acg | 3817 |
| Glu Asp Asn Asn Tyr Gly Asp Lys Asn Ile Ser Val Leu Ala Pro Thr | |
| 1125 | 1130 1135 |
| aac aac gat atg ttt ata ttg ccg ggt aat gtt tat cct gtt gaa att | 3865 |
| Asn Asn Asp Met Phe Ile Leu Pro Gly Asn Val Tyr Pro Val Glu Ile | |
| 1140 | 1145 1150 |
| gaa acc aaa gta agt gtt tct tat att ggt aga ggt ttt gac aaa aac | 3913 |
| Glu Thr Lys Val Ser Val Ser Tyr Ile Gly Arg Gly Phe Asp Lys Asn | |
| 1155 | 1160 1165 1170 |
| ggc acg cca ctt tct ggc gca cat gtt ttg aat gaa cca cat gtt atc | 3961 |
| Gly Thr Pro Leu Ser Gly Ala His Val Leu Asn Glu Pro His Val Ile | |
| 1175 | 1180 1185 |
| ctg gat gag gac ggt gga ttt tcg ttt gaa tat aca ggt aat gag aaa | 4009 |
| Leu Asp Glu Asp Gly Gly Phe Ser Phe Glu Tyr Thr Gly Asn Glu Lys | |
| 1190 | 1195 1200 |
| aca ctt ttt tta tta aag ggc aga act att tat aca tgt caa ctg ggg | 4057 |
| Thr Leu Phe Leu Leu Lys Gly Arg Thr Ile Tyr Thr Cys Gln Leu Gly | |
| 1205 | 1210 1215 |
| aaa aat aaa gtt cac aaa ggc att gtt ttc gtc gga gat gtt ata tgt | 4105 |
| Lys Asn Lys Val His Lys Gly Ile Val Phe Val Gly Asp Val Ile Cys | |
| 1220 | 1225 1230 |
| gat gtt aat agc aca agt tcc tta cca gat gaa ttt gta aag aac cca | 4153 |
| Asp Val Asn Ser Thr Ser Ser Leu Pro Asp Glu Phe Val Lys Asn Pro | |
| 1235 | 1240 1245 1250 |
| cgt gtg cag gat ttg ctg gca aag aat gat aaa gga taa acg | 4195 |
| Arg Val Gln Asp Leu Leu Ala Lys Asn Asp Lys Gly * Thr | |
| 1255 | 1260 |
| atg aat aag att tta ttt att ttt aca ttg ttt ttc tct tca gta ctt | 4243 |
| Asn Lys Ile Leu Phe Ile Phe Thr Leu Phe Phe Ser Ser Val Leu | |
| 1265 | 1270 1275 |

| | |
|---|------|
| ttt aca ttt gct gta tcg gca gat aaa att ccc gga gat gaa agc ata | 4291 |
| Phe Thr Phe Ala Val Ser Ala Asp Lys Ile Pro Gly Asp Glu Ser Ile | |
| 1280 1285 1290 | |
| act aat att ttt ggc ccg cgt gac agg aac gaa tct tcc ccc aaa cat | 4339 |
| Thr Asn Ile Phe Gly Pro Arg Asp Arg Asn Glu Ser Ser Pro Lys His | |
| 1295 1300 1305 1310 | |
| aat ata tta aat aac cat att aca gca tac agt gaa agt cat act ctg | 4387 |
| Asn Ile Leu Asn Asn His Ile Thr Ala Tyr Ser Glu Ser His Thr Leu | |
| 1315 1320 1325 | |
| tat gat agg atg act ttt tta tgt ttg tct tct cac aat aca ctt aat | 4435 |
| Tyr Asp Arg Met Thr Phe Leu Cys Leu Ser Ser His Asn Thr Leu Asn | |
| 1330 1335 1340 | |
| gga gca tgt cca acc agt gag aat cct agc agt tca tcg gtc agc ggt | 4483 |
| Gly Ala Cys Pro Thr Ser Glu Asn Pro Ser Ser Ser Ser Val Ser Gly | |
| 1345 1350 1355 | |
| gaa aca aat ata aca tta caa ttt acg gaa aaa aga agt tta ata aaa | 4531 |
| Glu Thr Asn Ile Thr Leu Gln Phe Thr Glu Lys Arg Ser Leu Ile Lys | |
| 1360 1365 1370 | |
| aga gag cta caa att aaa ggc tat aaa caa tta ttg ttc aaa agt gtt | 4579 |
| Arg Glu Leu Gln Ile Lys Gly Tyr Lys Gln Leu Leu Phe Lys Ser Val | |
| 1375 1380 1385 1390 | |
| aac tgc cca tcc ggc cta aca ctt aac tca gct cat ttt aac tgt aat | 4627 |
| Asn Cys Pro Ser Gly Leu Thr Leu Asn Ser Ala His Phe Asn Cys Asn | |
| 1395 1400 1405 | |
| aaa aac gcg gct tca ggt gca agt tta tat tta tat att cct gct ggc | 4675 |
| Lys Asn Ala Ala Ser Gly Ala Ser Leu Tyr Leu Tyr Ile Pro Ala Gly | |
| 1410 1415 1420 | |
| gaa cta aaa aat ttg cct ttt ggt ggt atc tgg gat gct act ctg aag | 4723 |
| Glu Leu Lys Asn Leu Pro Phe Gly Gly Ile Trp Asp Ala Thr Leu Lys | |
| 1425 1430 1435 | |
| tta aga gta aaa aga cga tat agt gag acc tat gga act tac act ata | 4771 |
| Leu Arg Val Lys Arg Arg Tyr Ser Glu Thr Tyr Gly Thr Tyr Thr Ile | |
| 1440 1445 1450 | |
| aat atc act att aaa tta act gat aag gga aat att cag ata tgg tta | 4819 |
| Asn Ile Thr Ile Lys Leu Thr Asp Lys Gly Asn Ile Gln Ile Trp Leu | |
| 1455 1460 1465 1470 | |
| cct cag ttc aaa agt gac gct cgc gtc gat ctt aac ttg cgt cca act | 4867 |
| Pro Gln Phe Lys Ser Asp Ala Arg Val Asp Leu Asn Leu Arg Pro Thr | |
| 1475 1480 1485 | |
| ggt ggg ggc aca tat att gga aga aat tct gtt gat atg tgc ttt tat | 4915 |
| Gly Gly Gly Thr Tyr Ile Gly Arg Asn Ser Val Asp Met Cys Phe Tyr | |
| 1490 1495 1500 | |

gat gga tat agt act aac agc agc tct ttg gag ata aga ttt cag gat 4963
Asp Gly Tyr Ser Thr Asn Ser Ser Ser Leu Glu Ile Arg Phe Gln Asp
1505 1510 1515

aac aat cct aaa tct gat ggg aaa ttt tat cta agg aaa ata aat gat 5011
Asn Asn Pro Lys Ser Asp Gly Lys Phe Tyr Leu Arg Lys Ile Asn Asp
1520 1525 1530

gac acc aaa gaa att gca tat act ttg tca ctt ctc ttg gcg ggt aaa 5059
Asp Thr Lys Glu Ile Ala Tyr Thr Leu Ser Leu Leu Leu Ala Gly Lys
1535 1540 1545 1550

agt tta act cca aca aat gga acg tca tta aat att gct gac gca gct 5107
Ser Leu Thr Pro Thr Asn Gly Thr Ser Leu Asn Ile Ala Asp Ala Ala
1555 1560 1565

tct ctg gaa aca aac tgg aat aga att aca gct gtc acc atg cca gaa 5155
Ser Leu Glu Thr Asn Trp Asn Arg Ile Thr Ala Val Thr Met Pro Glu
1570 1575 1580

atc agt gtt ccg gtg ttg tgt tgg cct gga cgt ttg caa ttg gat gca 5203
Ile Ser Val Pro Val Leu Cys Trp Pro Gly Arg Leu Gln Leu Asp Ala
1585 1590 1595

aaa gtg gaa aat ccc gag gct gga caa tat atg ggt aat att aat gtt 5251
Lys Val Glu Asn Pro Glu Ala Gly Gln Tyr Met Gly Asn Ile Asn Val
1600 1605 1610

act ttc aca cca agt agt caa aca ctc tag ata acaacaatat tggcgctatt 5304
Thr Phe Thr Pro Ser Ser Gln Thr Leu * Ile
1615 1620

gcgcgccaat attgtaaagg ggtaatctgt ttgttaacaa aacattttgt ttcaattcag 5364
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Phe Phe Ile Ile Leu Asp Leu * Asn * Ile Tyr Gln Ile
1625 1630 1635

aga tat aaa agc tga gtc atc ata gct att tat att ttt taa tac atc 5882
Arg Tyr Lys Ser * Val Ile Ile Ala Ile Tyr Ile Phe * Tyr Ile
1640 1645 1650

cag taa ggt ttt atc cac ttc tgt ttt cat tat ttt cct tga cat att 5930
Gln * Gly Phe Ile His Phe Cys Phe His Tyr Phe Pro * His Ile
1655 1660

tct aca atc att ggt atc tat ttt tga cat acc ata tat tat cat caa 5978
Ser Thr Ile Ile Gly Ile Tyr Phe * His Thr Ile Tyr Tyr His Gln

1665

1670

1675

tgc atc ctt taa atg tct tag tat gtc tcc gtt caa tct gaa tgc aac 6026
 Cys Ile Leu * Met Ser * Tyr Val Ser Val Gln Ser Glu Cys Asn
 1680 1685 1690

ata tgg ttt ttc tga taa aat ttg ctt ctg tat tct tac aga tat att 6074
 Ile Trp Phe Phe * * Asn Leu Leu Leu Tyr Ser Tyr Arg Tyr Ile
 1695 1700 1705

cac ccc tct ttc aag aaa tac agg t gatgctgccca acttactgat 6119
 His Pro Ser Phe Lys Lys Tyr Arg
 1710 1715

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 Ile Thr Asn Ile Phe Gly Pro Arg Asp Arg Asn Glu Ser Ser Pro Lys
 35 40 45
 His Asn Ile Leu Asn Asn His Ile Thr Ala Tyr Ser Glu Ser His Thr
 50 55 60
 Leu Tyr Asp Arg Met Thr Phe Leu Cys Leu Ser Ser His Asn Thr Leu
 65 70 75 80
 Asn Gly Ala Cys Pro Thr Ser Glu Asn Pro Ser Ser Ser Ser Val Ser
 85 90 95

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Gly | Glu | Thr | Asn | Ile | Thr | Leu | Gln | Phe | Thr | Glu | Lys | Arg | Ser | Leu | Ile | | |
| | | | 100 | | | | | 105 | | | | | 110 | | | | |
| Lys | Arg | Glu | Leu | Gln | Ile | Lys | Gly | Tyr | Lys | Gln | Leu | Leu | Phe | Lys | Ser | | |
| | | 115 | | | | | 120 | | | | | 125 | | | | | |
| Val | Asn | Cys | Pro | Ser | Gly | Leu | Thr | Leu | Asn | Ser | Ala | His | Phe | Asn | Cys | | |
| | | 130 | | | | 135 | | | | | 140 | | | | | | |
| Asn | Lys | Asn | Ala | Ala | Ser | Gly | Ala | Ser | Leu | Tyr | Leu | Tyr | Ile | Pro | Ala | | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | | |
| Gly | Glu | Leu | Lys | Asn | Leu | Pro | Phe | Gly | Gly | Ile | Trp | Asp | Ala | Thr | Leu | | |
| | | | 165 | | | | | 170 | | | | | | 175 | | | |
| Lys | Leu | Arg | Val | Lys | Arg | Arg | Tyr | Ser | Glu | Thr | Tyr | Gly | Thr | Tyr | Thr | | |
| | | 180 | | | | | 185 | | | | | | 190 | | | | |
| Ile | Asn | Ile | Thr | Ile | Lys | Leu | Thr | Asp | Lys | Gly | Asn | Ile | Gln | Ile | Trp | | |
| | 195 | | | | | | 200 | | | | | 205 | | | | | |
| Leu | Pro | Gln | Phe | Lys | Ser | Asp | Ala | Arg | Val | Asp | Leu | Asn | Leu | Arg | Pro | | |
| | 210 | | | | | 215 | | | | | 220 | | | | | | |
| Thr | Gly | Gly | Gly | Thr | Tyr | Ile | Gly | Arg | Asn | Ser | Val | Asp | Met | Cys | Phe | | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | | |
| Tyr | Asp | Gly | Tyr | Ser | Thr | Asn | Ser | Ser | Ser | Leu | Glu | Ile | Arg | Phe | Gln | | |
| | | | 245 | | | | | 250 | | | | | | 255 | | | |
| Asp | Asn | Asn | Pro | Lys | Ser | Asp | Gly | Lys | Phe | Tyr | Leu | Arg | Lys | Ile | Asn | | |
| | | 260 | | | | | 265 | | | | | | 270 | | | | |
| Asp | Asp | Thr | Lys | Glu | Ile | Ala | Tyr | Thr | Leu | Ser | Leu | Leu | Leu | Ala | Gly | | |
| | 275 | | | | | | 280 | | | | | 285 | | | | | |
| Ser | Leu | Thr | Pro | Thr | Asn | Gly | Thr | Ser | Leu | Asn | Ile | Ala | Asp | Ala | Ala | | |
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| Ser | Leu | Phe | Thr | Asn | Trp | Asn | Arg | Ile | Thr | Ala | Val | Thr | Met | Pro | Glu | | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | | |
| Ile | Ser | Val | Pro | Val | Leu | Cys | Trp | Pro | Gly | Arg | Leu | Gln | Leu | Asp | Ala | | |
| | | | 325 | | | | | | 330 | | | | | 335 | | | |
| Lys | Val | Glu | Asn | Pro | Glu | Ala | Gly | Gln | Tyr | Met | Gly | Asn | Ile | Asn | Val | | |
| | | | 340 | | | | | 345 | | | | | 350 | | | | |
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| Met | Asn | Lys | Ile | Leu | Phe | Ile | Phe | Thr | Leu | Phe | Phe | Ser | Ser | Gly | Phe | | |
| 1 | | | | 5 | | | | 10 | | | | | | 15 | | | |
| Phe | Thr | Phe | Ala | Val | Ser | Ala | Asp | Lys | Asn | Pro | Gly | Ser | Glu | Asn | Met | | |
| | | 20 | | | | | 25 | | | | | 30 | | | | | |
| Thr | Asn | Thr | Ile | Gly | Pro | His | Asp | Arg | Gly | Gly | Ser | Ser | Pro | Ile | Tyr | | |
| | | 35 | | | | 40 | | | | | 45 | | | | | | |
| Asn | Ile | Leu | Asn | Ser | Tyr | Leu | Thr | Ala | Tyr | Asn | Gly | Ser | His | His | Leu | | |
| | 50 | | | | 55 | | | | | 60 | | | | | | | |
| Tyr | Asp | Arg | Met | Ser | Phe | Leu | Cys | Leu | Ser | Ser | Gln | Asn | Thr | Leu | Asn | | |
| 65 | | | | | 70 | | | | 75 | | | | | | 80 | | |

Gly Ala Cys Pro Ser Ser Asp Ala Pro Gly Thr Ala Thr Ile Asp Gly
 85 90 95
 Glu Thr Asn Ile Thr Leu Gln Phe Thr Glu Lys Arg Ser Leu Ile Lys
 100 105 110
 Arg Glu Leu Gln Ile Lys Gly Tyr Lys Gln Phe Leu Phe Lys Asn Ala
 115 120 125
 Asn Cys Pro Ser Lys Leu Ala Leu Asn Ser Ser His Phe Gln Cys Asn
 130 135 140
 Arg Glu Gln Ala Ser Gly Ala Thr Leu Ser Leu Tyr Ile Pro Ala Gly
 145 150 155 160
 Glu Leu Asn Lys Leu Pro Phe Gly Gly Val Trp Asn Ala Val Leu Lys
 165 170 175
 Leu Asn Val Lys Arg Arg Tyr Thr Thr Tyr Gly Thr Tyr Thr Ile Asn
 180 185 190
 Ile Thr Val Asn Leu Thr Asp Lys Gly Asn Ile Gln Ile Trp Leu Pro
 195 200 205
 Gln Phe Lys Ser Asn Ala Arg Val Asp Leu Asn Leu Arg Pro Thr Gly
 210 215 220
 Gly Gly Thr Tyr Ile Gly Arg Asn Ser Val Asp Met Cys Phe Tyr Asp
 225 230 235 240
 Gly Tyr Ser Thr Met Ser Ser Ser Leu Glu Ile Arg Phe Gln Asp Asp
 245 250 255
 Asn Ser Lys Ser Asp Gly Lys Phe Tyr Leu Lys Lys Ile Asn Asp Asp
 260 265 270
 Ser Lys Glu Leu Val Tyr Thr Leu Ser Leu Leu Leu Ala Gly Lys Asn
 275 280 285
 Leu Thr Pro Thr Asn Gly Gln Ala Leu Asn Ile Asn Thr Ala Ser Leu
 290 295 300
 Glu Thr Asn Trp Asn Arg Ile Thr Ala Val Thr Met Pro Glu Ile Ser
 305 310 315 320
 Val Pro Val Leu Cys Trp Pro Gly Arg Leu Gln Leu Asp Ala Lys Val
 325 330 335
 Lys Asn Pro Glu Ala Gly Gln Tyr Met Gly Asn Ile Lys Ile Thr Phe
 340 345 350
 Thr Pro Ser Ser Gln Thr Leu
 355

<210> 30

<211> 364

<212> PRT

<213> Artificial Sequence

<220>

<223> ETEC Protein Homology Sequence

<400> 30

Met Lys Lys Val Ile Phe Val Leu Ser Met Phe Leu Cys Ser Gln Val
 1 5 10 15
 Tyr Gly Gln Ser Trp His Thr Asn Val Glu Ala Gly Ser Ile Asn Lys
 20 25 30
 Thr Phe Ser Ile Gly Pro Ile Asp Arg Ser Ala Ala Ala Ser Tyr Pro
 35 40 45
 Ala His Tyr Ile Phe His Glu Asx Val Ala Gly Tyr Asn Lys Asp His
 50 55 60

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Leu | Phe | Asp | Arg | Met | Thr | Phe | Leu | Cys | Met | Ser | Ser | Thr | Asp | Ala | 65 | 70 | 75 | 80 |
| Ser | Lys | Gly | Ala | Cys | Pro | Thr | Gly | Glu | Asn | Ser | Lys | Ser | Ser | Gln | Gly | 85 | 90 | 95 | |
| Glu | Thr | Asn | Ile | Lys | Leu | Ile | Phe | Thr | Glu | Lys | Lys | Ser | Leu | Ala | Arg | 100 | 105 | 110 | |
| Lys | Thr | Leu | Asn | Leu | Lys | Gly | Tyr | Lys | Arg | Phe | Leu | Tyr | Glu | Ser | Asp | 115 | 120 | 125 | |
| Arg | Cys | Ile | His | Tyr | Val | Asp | Lys | Met | Asn | Leu | Asn | Ser | His | Thr | Val | 130 | 135 | 140 | |
| Lys | Cys | Val | Gly | Ser | Phe | Thr | Arg | Gly | Val | Asp | Phe | Thr | Leu | Tyr | Ile | 145 | 150 | 155 | 160 |
| Pro | Gln | Gly | Glu | Ile | Asp | Gly | Leu | Leu | Thr | Gly | Gly | Ile | Trp | Lys | Ala | 165 | 170 | 175 | |
| Thr | Leu | Glu | Leu | Arg | Val | Lys | Arg | His | Tyr | Asp | Tyr | Asn | His | Gly | Thr | 180 | 185 | 190 | |
| Tyr | Lys | Val | Asn | Ile | Thr | Val | Asp | Leu | Thr | Asp | Lys | Gly | Asn | Ile | Gln | 195 | 200 | 205 | |
| Val | Trp | Thr | Pro | Lys | Phe | His | Ser | Asp | Pro | Arg | Ile | Asp | Leu | Asn | Leu | 210 | 215 | 220 | |
| Arg | Pro | Glu | Gly | Asn | Gly | Lys | Tyr | Ser | Gly | Ser | Asn | Val | Leu | Glu | Met | 225 | 230 | 235 | 240 |
| Cys | Leu | Tyr | Asp | Gly | Tyr | Ser | Thr | His | Ser | Gln | Ser | Ile | Glu | Met | Arg | 245 | 250 | 255 | |
| Phe | Gln | Asp | Asp | Ser | Gln | Thr | Gly | Asn | Asn | Glu | Tyr | Asn | Leu | Ile | Lys | 260 | 265 | 270 | |
| Thr | Gly | Glu | Pro | Leu | Lys | Lys | Leu | Pro | Tyr | Lys | Leu | Ser | Leu | Leu | Leu | 275 | 280 | 285 | |
| Gly | Gly | Arg | Glu | Phe | Tyr | Pro | Asn | Asn | Gly | Lys | Ala | Phe | Thr | Ile | Asn | 290 | 295 | 300 | |
| Asp | Thr | Ser | Ser | Leu | Phe | Ile | Asn | Trp | Asn | Arg | Ile | Lys | Ser | Val | Ser | 305 | 310 | 315 | 320 |
| Leu | Pro | Gln | Ile | Ser | Ile | Pro | Val | Leu | Cys | Trp | Pro | Ala | Asn | Leu | Thr | 325 | 330 | 335 | |
| Phe | Met | Ser | Glu | Leu | Asn | Asn | Pro | Glu | Ala | Gly | Glu | Tyr | Ser | Gly | Ile | 340 | 345 | 350 | |
| Leu | Asn | Val | Thr | Phe | Thr | Pro | Ser | Ser | Ser | Ser | Leu | | | | | 355 | 360 | | |

<210> 31

<211> 362

<212> PRT

<213> Artificial Sequence

<220>

<223> ETEC Protein Homology Sequence

<400> 31

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|
| Met | Lys | Lys | Ile | Phe | Ile | Phe | Leu | Ser | Ile | Ile | Phe | Ser | Ala | Val | Val | 1 | 5 | 10 | 15 |
| Ser | Ala | Gly | Arg | Tyr | Pro | Glu | Thr | Thr | Val | Gly | Asn | Leu | Thr | Lys | Ser | 20 | 25 | 30 | |
| Phe | Gln | Ala | Pro | Arg | Leu | Asp | Arg | Ser | Val | Gln | Ser | Pro | Ile | Tyr | Asn | 35 | 40 | 45 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Phe | Thr | Asn | His | Val | Ala | Gly | Tyr | Ser | Leu | Ser | His | Ser | Leu | Tyr |
| 50 | | | | | | 55 | | | | | 60 | | | | |
| Asp | Arg | Ile | Val | Phe | Leu | Cys | Thr | Ser | Ser | Ser | Asn | Pro | Val | Asn | Gly |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Ala | Cys | Pro | Thr | Ile | Gly | Thr | Ser | Gly | Val | Gln | Tyr | Gly | Thr | Thr | Thr |
| | | | | 85 | | | | | 90 | | | | | | 95 |
| Ile | Thr | Leu | Gln | Phe | Thr | Glu | Lys | Arg | Ser | Leu | Ile | Lys | Arg | Asn | Ile |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Asn | Ile | Ala | Gly | Asn | Lys | Lys | Pro | Ile | Trp | Glu | Asn | Gln | Ser | Cys | Asp |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Phe | Ser | Asn | Ile | Met | Val | Leu | Asn | Ser | Lys | Ser | Trp | Ser | Cys | Gly | Ala |
| | | 130 | | | | 135 | | | | | 140 | | | | |
| His | Gly | Asn | Ala | Asn | Gly | Thr | Ile | Leu | Asn | Leu | Tyr | Ile | Pro | Ala | Gly |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Glu | Ile | Asn | Lys | Leu | Pro | Phe | Gly | Gly | Ile | Trp | Glu | Ala | Thr | Leu | Ile |
| | | | 165 | | | | | | 170 | | | | | | 175 |
| Leu | Arg | Leu | Ser | Arg | Tyr | Gly | Glu | Val | Ser | Ser | Thr | His | Tyr | Gly | Asn |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Tyr | Thr | Val | Asn | Ile | Thr | Val | Asp | Leu | Thr | Asp | Lys | Gly | Asn | Ile | Gln |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Val | Trp | Leu | Pro | Gly | Phe | His | Ser | Asn | Pro | Arg | Val | Asp | Leu | Asn | Leu |
| | | 210 | | | | 215 | | | | | 220 | | | | |
| Arg | Pro | Ile | Gly | Asn | Tyr | Lys | Tyr | Ser | Gly | Ser | Asn | Ser | Leu | Asp | Met |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Cys | Phe | Tyr | Asp | Gly | Tyr | Ser | Thr | Asn | Ser | Asp | Ser | Met | Val | Ile | Lys |
| | | | 245 | | | | | | 250 | | | | | 255 | |
| Phe | Gln | Asp | Asp | Asn | Pro | Thr | Asn | Ser | Ser | Glu | Tyr | Asn | Leu | Tyr | Lys |
| | | 260 | | | | | | 265 | | | | | 270 | | |
| Ile | Gly | Gly | Thr | Glu | Lys | Leu | Pro | Tyr | Ala | Val | Ser | Leu | Ile | Gly | Glu |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Lys | Ile | Phe | Tyr | Pro | Val | Asn | Gly | Gln | Ser | Phe | Thr | Ile | Asn | Asp | Ser |
| | | 290 | | | | 295 | | | | | 300 | | | | |
| Ser | Val | Leu | Glu | Thr | Asn | Trp | Asn | Arg | Val | Thr | Ala | Val | Ala | Met | Pro |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Glu | Val | Asn | Val | Pro | Val | Leu | Cys | Trp | Pro | Ala | Arg | Leu | Leu | Leu | Asn |
| | | | 325 | | | | | | 330 | | | | | 335 | |
| Ala | Asp | Val | Asn | Ala | Pro | Asp | Ala | Gly | Gln | Tyr | Ser | Gly | Gln | Ile | Tyr |
| | | | 340 | | | | | 345 | | | | | 350 | | |
| Ile | Thr | Phe | Thr | Pro | Ser | Val | Glu | Asn | Leu | | | | | | |
| | | 355 | | | | | 360 | | | | | | | | |

<210> 32

<211> 353

<212> PRT

<213> Artificial Sequence

<220>

<223> ETEC Protein Homology Sequence

<400> 32

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Asn | Ile | Cys | Lys | Trp | Thr | Ser | Met | Thr | Ala | His | Trp | Ser | Ala |
| 1 | | | | 5 | | | | 10 | | | | | 15 | | |
| Ile | Ile | Asn | Phe | Ile | Arg | Lys | Tyr | Val | Tyr | Pro | Ala | Arg | Ile | Ile | Ala |
| | | 20 | | | | | 25 | | | | | | 30 | | |

Ile Leu Ala Gly Ala Thr Leu Pro Gln Val Ala Asp Ala Ile Thr Val
 35 40 45
 Asp Leu Asn Tyr Asp Lys Asn Asn Val Ala Val Ile Thr Pro Val Trp
 50 55 60
 Ser Gln Glu Trp Ser Val Ala Asn Val Leu Gly Gly Trp Val Cys Arg
 65 70 75 80
 Ser Asn Arg Asn Glu Asn Glu Gly Cys Glu Glu Thr His Leu Val Trp
 85 90 95
 Trp Tyr Ala Phe Gly Ala Tyr Ser Ile Arg Leu Arg Phe Arg Glu Gln
 100 105 110
 Ile Ser His Ala Glu Ile Thr Leu Ile Leu Leu Gly Ser Val Arg Asp
 115 120 125
 Ala Cys Thr Gly Val Ile Asn Met Asn Ala Ala Ala Cys Gln Trp Gly
 130 135 140
 Arg Ser Leu Lys Leu Arg Ile Pro Ser Glu Glu Leu Ala Lys Ile Pro
 145 150 155 160
 Thr Ser Gly Thr Trp Lys Ala Thr Leu Val Leu Asp Tyr Leu Gln Trp
 165 170 175
 Gly Gly Asp Asp Pro Leu Gly Thr Ser Thr Thr Asp Ile Thr Leu Asn
 180 185 190
 Val Thr Asp His Phe Ala Glu Asn Ala Ala Ile Tyr Phe Pro Gln Phe
 195 200 205
 Gly Thr Ala Thr Pro Arg Val Asp Leu Asn Leu His Arg Met Asn Ala
 210 215 220
 Ser Gln Met Ser Gly Arg Ala Asn Leu Asp Met Cys Leu Tyr Asp Gly
 225 230 235 240
 Gly Val Lys Ala Arg Ser Leu Gln Met Met Glu Gly Ser Asn Lys Ser
 245 250 255
 Gly Thr Gly Phe Gln Val Ile Lys Ser Asp Ser Ala Asp Thr Ile Asp
 260 265 270
 Tyr Ala Val Ser Met Asn Tyr Gly Gly Arg Ser Ile Pro Val Thr Arg
 275 280 285
 Gly Val Glu Phe Ser Leu Asp Asn Val Asp Lys Ala Ala Thr Arg Pro
 290 295 300
 Val Val Leu Pro Gly Gln Arg Gln Ala Val Arg Cys Val Pro Val Pro
 305 310 315 320
 Leu Thr Leu Thr Thr Gln Pro Phe Asn Ile Arg Glu Lys Arg Ser Gly
 325 330 335
 Glu Tyr Gln Gly Thr Leu Thr Val Thr Met Leu Met Gly Thr Gln Thr
 340 345 350
 Pro

<210> 33

<211> 165

<212> PRT

<213> Artificial Sequence

<220>

<223> ETEC Protein Homology Sequence

<400> 33

Met Lys Leu Lys Lys Thr Ile Gly Ala Met Ala Leu Thr Thr Met Phe
 1 5 10 15

Val Ala Met Ser Ala Ser Ala Val Glu Lys Asn Ile Thr Val Thr Ala
 20 25 30
 Ser Val Asp Pro Thr Ile Asp Ile Leu Gln Ala Asp Gly Ser Ser Leu
 35 40 45
 Pro Thr Ala Val Glu Leu Thr Tyr Ser Pro Ala Ala Ser Arg Phe Glu
 50 55 60
 Asn Tyr Lys Ile Ala Thr Lys Val His Thr Asn Val Ile Asn Lys Asn
 65 70 75 80
 Val Leu Val Lys Leu Val Asn Asp Pro Lys Leu Thr Asn Val Leu Asp
 85 90 95
 Ser Thr Lys Gln Leu Pro Ile Thr Val Ser Tyr Gly Gly Lys Leu Ser
 100 105 110
 Thr Ala Asp Val Thr Phe Glu Pro Ala Glu Leu Asn Phe Gly Thr Ser
 115 120 125
 Gly Val Thr Gly Val Ser Ser Ser Gln Asp Leu Val Ile Gly Ala Thr
 130 135 140
 Thr Ala Gln Ala Pro Ser Ala Asn Tyr Ser Gly Val Val Ser Ile Leu
 145 150 155 160
 Met Thr Leu Ala Ser
 165

<210> 34

<211> 168

<212> PRT

<213> Artificial Sequence

<220>

<223> ETEC Protein Homology Sequence

<400> 34

Met Lys Phe Lys Lys Thr Ile Gly Ala Met Ala Leu Thr Thr Met Phe
 1 5 10 15
 Val Ala Val Ser Ala Ser Ala Val Glu Lys Asn Ile Thr Val Thr Ala
 20 25 30
 Ser Val Asp Pro Ala Ile Asp Leu Leu Gln Ala Asp Gly Asn Ala Leu
 35 40 45
 Pro Ser Val Lys Leu Ala Tyr Ser Pro Ala Ser Lys Ile Phe Glu Ser
 50 55 60
 Tyr Arg Val Met Thr Gln Val His Thr Asn Asp Ala Thr Lys Lys Val
 65 70 75 80
 Ile Val Lys Leu Ala Asp Thr Pro Gln Leu Thr Asp Val Leu Asn Ser
 85 90 95
 Thr Val Gln Met Pro Ile Ser Val Ser Trp Gly Gly Val Leu Ser Thr
 100 105 110
 Thr Ala Lys Glu Phe Glu Ala Ala Ala Leu Gly Tyr Ser Ala Ser Gly
 115 120 125
 Val Asn Gly Val Ser Ser Ser Gln Glu Leu Val Ile Ser Ala Ala Pro
 130 135 140
 Lys Thr Ala Gly Thr Ala Pro Thr Ala Gly Asn Tyr Ser Gly Val Val
 145 150 155 160
 Ser Leu Val Met Thr Leu Gly Ser
 165

<210> 35
 <211> 170
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> ETEC Protein Homology Sequence

<400> 35
 Met Lys Leu Lys Lys Thr Ile Gly Ala Met Ala Leu Ala Thr Leu Phe
 1 5 10 15
 Ala Thr Met Gly Ala Ser Ala Val Glu Lys Thr Ile Ser Val Thr Ala
 20 25 30
 Ser Val Asp Pro Thr Val Asp Leu Leu Gln Ser Asp Gly Ser Ala Leu
 35 40 45
 Pro Asn Val Ala Leu Thr Tyr Ser Pro Ala Val Asn Asn Phe Glu Ala
 50 55 60
 His Thr Ile Asn Thr Val Val His Thr Asn Asp Ser Asp Lys Gly Val
 65 70 75 80
 Val Val Lys Leu Ser Ala Asp Pro Val Leu Ser Asn Val Leu Asn Pro
 85 90 95
 Thr Leu Gln Ile Pro Val Ser Val Asn Phe Ala Gly Lys Pro Leu Ser
 100 105 110
 Thr Thr Gly Ile Thr Ile Asp Ser Asn Asp Leu Asn Phe Ala Ser Ser
 115 120 125
 Gly Val Asn Tyr Val Ser Ser Thr Gln Lys Leu Ser Ile His Ala Asp
 130 135 140
 Ala Thr Arg Val Thr Gly Gly Ala Leu Thr Ala Gly Gln Tyr Gln Gly
 145 150 155 160
 Leu Val Ser Ile Ile Leu Thr Lys Ser Thr
 165 170

<210> 36
 <211> 170
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> ETEC Protein Homology Sequence

<400> 36
 Met Lys Leu Asn Lys Ile Ile Gly Ala Leu Val Leu Ser Ser Thr Phe
 1 5 10 15
 Val Ser Met Gly Ala Ser Ala Ala Glu Lys Asn Ile Thr Val Thr Ala
 20 25 30
 Ser Val Asp Pro Thr Ile Asp Leu Met Gln Ser Asp Gly Thr Ala Leu
 35 40 45
 Pro Ser Ala Val Asn Ile Ala Tyr Leu Pro Gly Glu Lys Arg Phe Glu
 50 55 60
 Ser Ala Arg Ile Asn Thr Gln Val His Thr Asn Asn Lys Thr Lys Gly
 65 70 75 80
 Ile Gln Ile Lys Leu Thr Asn Asp Asn Val Val Met Thr Asn Leu Ser
 85 90 95
 Asp Pro Ser Lys Thr Ile Pro Leu Glu Val Ser Phe Ala Gly Thr Lys

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| | | | 100 | | | | | 105 | | | | | 110 | | | | |
| Leu | Ser | Thr | Ala | Ala | Thr | Ser | Ile | Thr | Ala | Asp | Gln | Leu | Asn | Phe | Gly | | |
| | | | 115 | | | | | 120 | | | | | 125 | | | | |
| Ala | Ala | Gly | Val | Glu | Thr | Val | Ser | Ala | Thr | Lys | Glu | Leu | Val | Ile | Asn | | |
| | | | 130 | | | | | 135 | | | | | 140 | | | | |
| Ala | Gly | Ser | Thr | Gln | Gln | Thr | Asn | Ile | Val | Ala | Gly | Asn | Tyr | Gln | Gly | | |
| 145 | | | | | | 150 | | | | 155 | | | | | 160 | | |
| Leu | Val | Ser | Ile | Val | Leu | Thr | Gln | Glu | Pro | | | | | | | | |
| | | | | 165 | | | | | 170 | | | | | | | | |

<210> 37
 <211> 168
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> ETEC Protein Homology Sequence

<400> 37

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Met | Lys | Leu | Lys | Tyr | Thr | Ile | Gly | Ala | Met | Ala | Leu | Ser | Thr | Ile | Phe | | |
| 1 | | | | 5 | | | | 10 | | | | | | 15 | | | |
| Val | Ala | Val | Ser | Ala | Ser | Ala | Val | Glu | Lys | Asn | Ile | Thr | Val | Thr | Ala | | |
| | | | 20 | | | | | 25 | | | | | 30 | | | | |
| Ser | Val | Asp | Pro | Thr | Ile | Asp | Ile | Leu | Gln | Ala | Asn | Gly | Ser | Ala | Leu | | |
| | | 35 | | | | | 40 | | | | | 45 | | | | | |
| Pro | Thr | Ala | Val | Asp | Leu | Thr | Tyr | Leu | Pro | Gly | Ala | Lys | Thr | Phe | Glu | | |
| | 50 | | | | | 55 | | | | 60 | | | | | | | |
| Asn | Tyr | Ser | Val | Leu | Thr | Gln | Ile | Tyr | Thr | Asn | Asp | Pro | Ser | Lys | Gly | | |
| 65 | | | | | 70 | | | | | 75 | | | | 80 | | | |
| Leu | Asp | Val | Arg | Leu | Val | Asp | Thr | Pro | Lys | Leu | Thr | Asn | Ile | Leu | Gln | | |
| | | | 85 | | | | | 90 | | | | | 95 | | | | |
| Pro | Thr | Ser | Thr | Ile | Pro | Leu | Thr | Val | Ser | Trp | Ala | Gly | Arg | Thr | Leu | | |
| | | | 100 | | | | | 105 | | | | | 110 | | | | |
| Ser | Thr | Ser | Ala | Gln | Lys | Ile | Ala | Val | Gly | Asp | Leu | Gly | Phe | Gly | Ser | | |
| | | 115 | | | | | 120 | | | | | 125 | | | | | |
| Thr | Gly | Thr | Ala | Gly | Val | Ser | Asn | Ser | Lys | Glu | Leu | Val | Ile | Gly | Ala | | |
| | 130 | | | | | 135 | | | | | | 140 | | | | | |
| Thr | Thr | Ser | Gly | Lys | Pro | Ser | Ala | Gly | Lys | Tyr | Gln | Gly | Val | Val | Ser | | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | | |
| Ile | Val | Met | Thr | Gln | Ser | Thr | Asn | | | | | | | | | | |
| | | | | 165 | | | | | | | | | | | | | |

<210> 38
 <211> 142
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> ETEC Protein Homology Sequence

<400> 38

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Val | Asp | Pro | Thr | Ile | Asp | Ile | Leu | Gln | Ala | Asn | Gly | Ser | Ala | Leu | Pro | | |
| 1 | | | | 5 | | | | 10 | | | | | | 15 | | | |

```

Thr Ala Val Asp Leu Thr Tyr Leu Pro Gly Ala Lys Thr Phe Glu Asn
    20                25                30
Tyr Ser Val Leu Thr Gln Ile Tyr Thr Asn Asp Pro Ser Lys Gly Leu
    35                40                45
Asp Val Arg Leu Val Asp Thr Pro Lys Leu Thr Asn Ile Leu Gln Pro
    50                55                60
Thr Ser Thr Ile Pro Leu Thr Val Ser Trp Ala Gly Lys Thr Leu Ser
    65                70                75                80
Thr Ser Ala Gln Lys Ile Ala Val Gly Asp Leu Gly Phe Gly Ser Thr
    85                90                95
Gly Thr Ala Gly Val Ser Asn Ser Lys Glu Leu Val Ile Gly Ala Thr
    100               105               110
Thr Ser Gly Thr Ala Pro Ser Ala Gly Lys Tyr Gln Gly Val Val Ser
    115               120               125
Ile Val Met Thr Gln Ser Thr Asp Thr Ala Ala Pro Val Pro
    130               135               140

```

```

<210> 39
<211> 133
<212> PRT
<213> Artificial Sequence

```

```

<220>
<223> ETEC Protein Homology Sequence

```

```

<400> 39
Val Asp Pro Lys Leu Asp Leu Leu Gln Ala Asp Gly Thr Ser Leu Pro
  1          5          10          15
Asp Ser Ile Ala Leu Thr Tyr Ser Ser Ala Ser Asn Asn Phe Glu Val
    20          25          30
Tyr Ser Leu Asn Thr Ala Ile His Thr Asn Asp Lys Thr Lys Ala Val
    35          40          45
Val Val Lys Leu Ser Ala Pro Ala Val Leu Ser Asn Ile Met Lys Pro
    50          55          60
Ser Ser Gln Ile Pro Met Lys Val Thr Leu Gly Gly Lys Thr Leu Ser
    65          70          75          80
Thr Ala Asp Ala Glu Phe Ala Ala Asp Thr Leu Asn Phe Gly Ala Ser
    85          90          95
Gly Val Glu Asn Val Ser Ser Val Gln Gln Leu Thr Ile His Ala Glu
    100         105         110
Ala Ala Pro Pro Glu Ala Gly Asn Tyr Gln Gly Val Ile Ser Leu Ile
    115         120         125
Met Thr Gln Lys Thr
    130

```

```

<210> 40
<211> 134
<212> PRT
<213> Artificial Sequence

```

```

<220>
<223> ETEC Protein Homology Sequence

```

<400> 40

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Asp | Pro | Lys | Leu | Asp | Leu | Leu | Gln | Ala | Asp | Gly | Thr | Ser | Leu | Pro |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Asp | Ser | Ile | Ala | Leu | Thr | Tyr | Ser | Ser | Ala | Ser | Asn | Asn | Phe | Glu | Val |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Tyr | Ser | Leu | Asn | Thr | Ala | Ile | His | Thr | Asn | Asp | Lys | Ser | Lys | Gly | Val |
| | | | 35 | | | | 40 | | | | | | 45 | | |
| Val | Val | Lys | Leu | Ser | Ala | Ser | Pro | Val | Leu | Ser | Asn | Ile | Met | Pro | Asn |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Ser | Gln | Ile | Pro | Met | Lys | Val | Thr | Leu | Gly | Gly | Glu | Thr | Leu | Asn | Thr |
| 65 | | | | | 70 | | | | | 75 | | | | 80 | |
| Thr | Asp | Thr | Glu | Phe | Thr | Val | Asp | Thr | Leu | Asn | Phe | Gly | Thr | Ser | Gly |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Val | Glu | Asn | Val | Ser | Ser | Thr | Gln | Gln | Leu | Thr | Ile | His | Ala | Asp | Thr |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Gln | Gly | Thr | Ala | Pro | Glu | Ala | Gly | Asn | Tyr | Gln | Gly | Ile | Ile | Ser | Leu |
| | | 115 | | | | | 120 | | | | | | 125 | | |
| Ile | Met | Thr | Gln | Lys | Thr | | | | | | | | | | |
| | 130 | | | | | | | | | | | | | | |